

Claims Appendix

1. A process for cracking an olefin-rich hydrocarbon feedstock which is selective towards light olefins in the effluent, the process comprising contacting a hydrocarbon feedstock containing olefins in an amount within the range of 10 to 100 wt.% having a first composition of one or more olefinic components with a crystalline silicate catalyst to produce an effluent having a second composition of one or more olefinic components in which the olefin distribution is different from the olefin distribution of said feedstock, the feedstock and the effluent having substantially the same olefin content by weight therein wherein the olefin content of the effluent is within $\pm 15\%$ of the olefin content of the feedstock, adding hydrogen to the olefin-rich feedstock prior to contact of said feedstock with said crystalline silicate catalyst to provide for the olefin-rich feedstock contacting the catalyst in the presence of hydrogen for enhancing the stability of the catalyst.
2. A process according to claim 1 wherein the hydrogen partial pressure is up to 7.5 bar.
3. A process according to claim 2 wherein the hydrogen partial pressure is from 0.1 to 5 bar.
5. A process according to claim 1 wherein at least a part of the hydrogen is recycled from the effluent.
6. A process according to claim 1 wherein ethylene has been added to a C_{4+} hydrocarbon feedstock.
7. A process according to claim 6 wherein at least a part of the ethylene is recycled from the effluent.
8. A process according to claim 6 wherein the ethylene comprises from 0.1 to 50 wt % of the hydrocarbon feedstock.

9. A process according to claim 6 further comprising recycling at least a part of C.sub.5 or greater olefins from the effluent to the feedstock.
10. A process according to claim 1 wherein the catalyst comprises silicalite.
11. A process according to claim 1 wherein the catalyst has a silicon/aluminium atomic ratio of at least 180.
12. A process according to claim 1 wherein the feedstock comprises a light cracked naphtha.
13. A process according to claim 1 wherein the feedstock comprises a C₄ cut from a fluidised-bed catalytic cracking unit in a refinery, or a C₄ cut from a unit in a refinery for producing methyl tert-butyl ether or a C₄ cut from a steam-cracking unit.
14. A process according to claim 1 wherein the catalytic cracking has a propylene yield on an olefin basis of from 30 to 50% based on the olefin content of the feedstock.
16. A process according to claim 1 wherein the feedstock contacts the catalyst at an inlet temperature of from 500 to 600° C.
17. A process according to claim 16 wherein the inlet temperature is from 540 to 580° C.
18. A process according to claim 1 wherein the feedstock contacts the catalyst at an olefin partial pressure of from 0.1 to 2 bar.
19. A process according to claim 18 wherein the olefin partial pressure is around atmospheric pressure.

20. A process according to claim 1 wherein the feedstock is passed over the catalyst at an LHSV of from 10 to 30 h⁻¹.
21. A process according to claim 1 wherein the feedstock has a maximum diene concentration therein of 0.1 wt %.
22. A process according to claim 1 wherein said feedstock contains 50 wt.% olefins.
23. A process for cracking an olefin-rich feedstock which is selective to light olefins in the effluent, comprising:
- (a) supplying an olefin rich hydrocarbon feedstock containing from 10 to 100 wt.% olefins into a reaction zone which contains a crystalline silicate catalyst of the MFI family which is effective for the cracking of the olefins;
 - (b) supplying hydrogen to said reaction zone at a hydrogen partial pressure of not more than 7.5 bar whereby hydrogen is added to the olefin-rich feedstock prior to supplying said olefin-rich feedstock into said reaction zone to provide that the olefin-rich feedstock contacts the catalyst in the presence of hydrogen to enhance the stability of the catalyst;
 - (c) operating of said reaction zone at temperature and pressure conditions effective to cause cracking of olefins in said feedstock to produce olefins which are lighter than olefins in the feedstock; and
 - (d) recovering an effluent from said reaction zone which has an olefin content by molecular weight within $\pm 15\%$ of the olefin content of the feedstock and which has a lower average molecular weight than that of the olefin content of the feedstock.
24. The process according to claim 23 wherein the hydrogen partial pressure is within the range of 0.1 to 5 bar.
25. The process of claim 23 wherein said effluent has an olefin content which is within $\pm 10\%$ of the olefin content of the feedstock.

26. The process of claim 23 wherein said feedstock contains olefins having four or more carbon atoms and wherein ethylene is added to the feedstock prior to the introduction of said feedstock into said reaction zone.

27. The process of claim 26 wherein a stream of C₃ or greater olefins is added to the feedstock prior to the introduction of the feedstock into the reaction zone.

28. The process of claim 23 further comprising supplying said effluent to a separation zone and operation said separation zone to recover a light fraction containing ethylene and a heavier fraction containing C₃-C₅ olefins, recycling ethylene in said light fraction to the feedstock prior to the introduction of the feedstock into the reaction zone and recycling C₃ olefins in said heavier fraction to said feedstock prior to the introduction of said feedstock into said reaction zone.

29. The process of claim 28 wherein the ethylene recycled to said feedstock contains hydrogen.

30. A process according to claim 23 wherein said feedstock contains 50 wt.% olefins.

31. A process for cracking an olefin-rich feedstock which is selective to light olefins including propylene in the effluent, comprising:

(a) supplying an olefin rich hydrocarbon feedstock containing from 10 to 100 wt.% olefins and containing one or more olefins of C₄ or greater into a reaction zone containing a crystalline silicate catalyst which is effective for the cracking of the olefins;

(b) supplying hydrogen to said reaction zone at a hydrogen partial pressure of not more than 7.5 bar whereby hydrogen is added to the olefin-rich feedstock prior to supplying said olefin-rich feedstock into said reaction zone to provide that the olefin-rich feedstock contacts the catalyst in the presence of hydrogen to enhance the stability of the catalyst;

(c) operating said reaction zone at temperature and pressure conditions effective to cause cracking of olefins in said feedstock to produce olefins which are lighter than olefins in the feedstock and to produce a propylene yield within the range of 30 to 50 wt.% based on the olefin content of the feedstock; and

(d) recovering an effluent from said reaction zone which has an olefin content by weight within $\pm 15\%$ of the olefin content of the feedstock and which has a lower average molecular weight than that of the olefin content of the feedstock, said effluent containing propylene in an amount within the range of 30 to 50 wt.% of the total olefin content of the feedstock.

32. The process of claim 31 wherein said crystalline silicate catalyst is an MFI-type catalyst having a silicon/aluminum atomic ratio within the range of 300-500.

33. The method of claim 32 wherein said catalyst has a silicon/aluminum atomic ratio within the range of 300-480.

34. The process of claim 31 wherein said reaction zone is operated at an inlet temperature within the range of 500-600 °C and an olefin partial pressure within the range of 0.1-2 bars.

35. The process of claim 31 wherein said feedstock contains greater than 50 wt.% C₄ as an olefin.